



Harbors

Module NH3: Formulation –
Measures, Strategies and Plans



Student Learning Objectives

The student will be able to:

- Identify management measures
- Develop plan formulation strategies for navigation projects
- Use strategies to formulate alternative plans
- Explain the basic economic evaluation of navigation plans



Deep-Draft Navigation Formulation

- Meets objectives
 - Accommodate larger ships
 - Reduce traffic delays
 - Increase safety
- Recognizes constraints
 - Resources – endangered species
 - Institutional – disposal
 - Financial – sponsor's resources
- Develops
 - Management measures
 - Plan formulation strategies
 - Plans



Approach to Formulation

- Interview experienced and/or technical experts
- Consult documents of similar studies
- Group exercises – brainstorming



Identifying Management Measures

- Structural measures
- Nonstructural measures

Exercise: Let's Brainstorm a list

Structural Measures

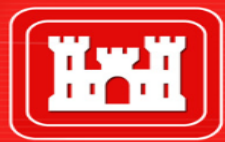
- Channel deepening and widening
- Anchorages
- Breakwaters
- Berthing areas
- Mooring areas
- Disposal areas
- Methods e.g phased construction





Structural Measures (Breakwater, confined disposal site)





Structural Measures (Detached straight breakwater)





Structural Measures

(Small boat harbor associated with deep draft)





Structural Measures (Harbor deepening)



Structural Measures (Dredging & Beach Nourishment)





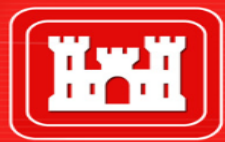
Structural Measures (Jetty Construction)





Nonstructural Measures

- Operational practices
 - Traffic Controls
 - Changes in operating procedures (tides, lightering, etc)
- Modification of local service facilities
 - Storage
 - Berthing
 - Structural measures by non-Federal interests are often referred to as nonstructural measures.



Develop Plan Formulation Strategies

Strategies would reflect the desires of the non-Federal sponsor and other stakeholders

- Avoid high cost relocations
- Avoid significant environmental resources
- Serve different terminals/ports
- Evaluate the impacts of adding channel reaches
- Addressing different combinations of the planning objectives
- Remember disposal options and beneficial uses
- Make sure that all stakeholders are involved in the development of formulation strategies



Formulate Alternatives

- Combining measures – examples
 - Channel deepening with anchorages
 - Channel deepening with phased widening
 - Traffic management with anchorages
 - Channel deepening with beneficial uses of dredged material
- Synergies – look for opportunities to serve other needs



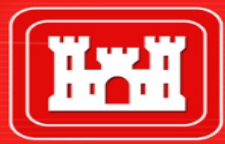
Evaluation of Alternatives

- Verify technical/engineering feasibility
- Evaluate environmental impacts
- Perform economic analysis of costs and benefits
- Account for uncertainty through sensitivity analysis



NED Costs

- Construction costs
 - General Navigation Facilities
 - Project features – breakwaters, jetties, etc.
 - Dredging and disposal
 - Real estate
 - Mitigation
 - Local Service Facilities
- Operation and maintenance costs
- Interest during construction
- Associated costs



Associated Costs - What Are They and Who Pays

- Frequently overlooked because
 - Often not paid by non-Federal partner
 - Incurred by project users
- Associated with the general navigation feature to achieve the estimated benefits
- Represent costs not otherwise accounted for
 - Variable costs of doing business
 - May not be self-liquidating
 - Related to project throughput



NED Benefits - Basically Savings in Transportation Unit Costs

- Cost Reduction Benefit (same origin-destination and same mode).
 - Reductions in costs incurred from trip delays
 - Increased loads in existing ships
 - Reduction in costs because larger or longer tows
 - Reduction in costs because of using larger ships
- Change in mode benefits
- Shift of origin-destination benefits
- Induced movement benefit (if you build it, will they come?)
- Reduction in vessel damages

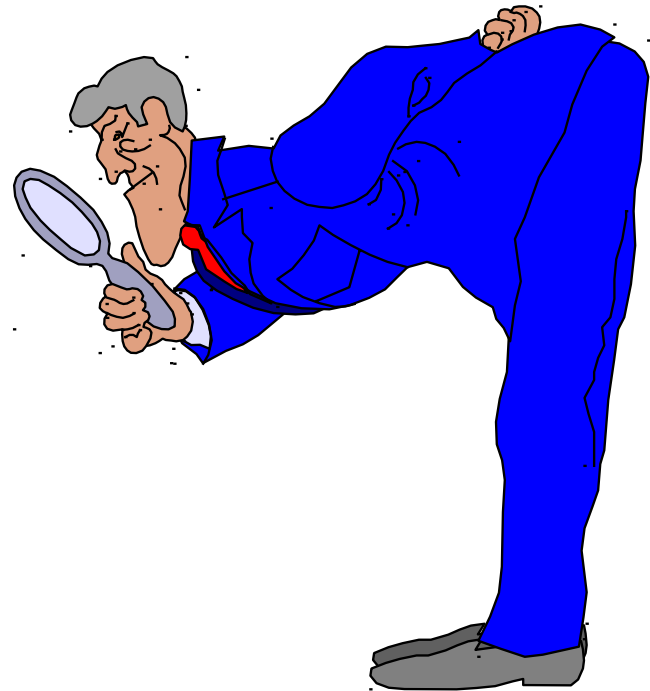


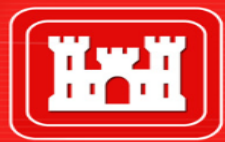
Take Away Points

- Plan formulation is the art of creating plans to address the objectives and constraints related to navigation problems and opportunities
- Don't reinvent the wheel. Use previous studies, conduct interviews and brainstorm.
- In developing plan formulation strategies, you need to understand the basic policies affecting plans for navigation improvements. Be sure to consider timing as well as the measures themselves.
- Breakpoints in costs are especially important to formulation and associated costs need to be included in the analysis

Where We are Going

- Next, we'll cover reformulation to optimize the alternative plans.
- We'll cover incremental analysis and learn to identify the NED plan.
- We'll also learn how to deal with locally preferred plans





Challenge Question:

What issues would arise in having formulation accomplished as an in-kind service?